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THE AMERICAN JOURNAL
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OPHTHALMOLOGY

VOL. XXXIII. JANUARY, 1916. No. 1

ORIGINAL ARTICLES.

THE CHOROIDAL TUBERCLE IN TUBERCULOUS MENINGITIS.*

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From the Department of Internal Medicine, Washington University Medical School, St. Louis.

On several occasions during the past two years the discussion had arisen between members of the Ophthalmological Department and the Medical Department of Washington University as to the frequency of choroidal tubercles in tuberculous meningitis. On both sides there has been considerable difference of opinion, some believing that they should be found anywhere in from fifty to one hundred per cent. of the cases, others that they were very rarely or infrequently found. During the past few months a case of tuberculous meningitis appeared on our medical ward and again the old discussion arose, and Doctor Dock asked me to investigate the literature for statistics. The results of this search is all that I wish to present to you in order that we might come to a common understanding—to conclude from statistics rather than individual opinion and to stimulate more active work on our own statistics.

Tuberculous meningitis[1] as a distinct disease was first described clinically by Robert Whytt in 1763.[2] He called it hydrops ventriculorum cerebri, but realized that it was not the ordinary hydrocephalus and believed it was due to a serous exudate. He also believed that tuberculous meningitis was the cause of most cases of so-called acute hydrocephalus at that

*Read at the twenty-seventh meeting of the Washington University Medical Society, January 10, 1916, St. Louis.

time. In 1827 L. A. Gölin[3] expressed the view that the serous exudate was due to an inflammatory process, while in 1827 Guersant[4] pointed out a granular form of meningitis. Papavaine[5] showed in 1830 that acute hydrocephalus was directly due to tuberculosis. Five years later works appeared independently by Rufz, Fabre and Constant and Gerhardt, showing the relationship between tuberculous meningitis and tuberculosis elsewhere. Following these articles numerous men started to study the pathology of the disease. Koch's[6] discovery of the tubercle bacillus in 1882 and Quincke's[7] lumbar puncture in 1891 established the disease as a clinical entity not to be disputed.

Our attention was first called to the occurrence of tubercles of the choroid[8] by Gueneau deMussy about 1830.[9] He recognized small nodules in the choroid in cases of miliary tuberculosis. After the first real demonstration anatomically of choroidal tubercles by Ed. Jaeger[10] 1855, Manz[11] 1858, demonstrated another case. After several years Cohnheim[12] showed the great frequency of choroidal tubercles in miliary tuberculosis. B. Fraenkel,[13] 1867, was the first to show ophthalmoscopically the presence of tubercles in the choroid. He found them in two cases of tuberculous meningitis and thereby established a diagnosis of miliary tuberculosis. Later others followed so that the condition was universally recognized as an additional sign in the diagnosis in both miliary tuberculosis and tuberculous meningitis.

Before giving the statistics in detail, I thought it might be of interest to review some of our text-books, and see just what we are teaching on the subject of choroidal tubercles. Therefore, I have abstracted a few of the better books on medicine, neurology, pediatrics and ophthalmology. The pediatrists have furnished me with the most valuable as well as the most conflicting literature. Still[14] believes that "Tubercles of the choroid are almost never seen apart from general miliary tuberculosis". He found only two cases of choroidal tubercles in all of his experience with tuberculous meningitis. Curlee[15] says that tubercles of the choroid will be found in most cases, while Holt[16] dismisses the subject by saying, "An examination with the ophthalmoscope usually shows the presence of choked disc." There seems to be a tendency prevalent among pediatrists to ignore the presence of tubercles in the choroid, or at least, not to place any great amount of confidence in the hope of finding them. Holt[17] in reporting three hundred cases of acute meningitis of which,

in his own figures, seventy-five per cent. were tuberculous, does not even mention choroidal tubercles. Meyers[18] another pediatrist, reports one hundred and five cases of tuberculous meningitis, also not mentioning their occurrence. Everything is mentioned, but the ophthalmoscopic examination is neglected, or at least omitted. Meyers gives complete autopsy reports on about one-fourth of his cases, but nothing is said about the eyes. He reports tuberculosis in almost every organ and tissue of the body and failed to look at the eyes at autopsy. Only one conclusion can be drawn and that is that tubercles of the choroid are not looked for by these men either in life or at post-mortem. Conservative pathological reports, such as Litten's,[19] gave seventy-five per cent. of choroidal tubercles at autopsy in tuberculous meningitis. As to the idea of Holt that the ophthalmoscopic examination usually shows choked disc, I do not believe that statistics will bear him out. Choked disc is even less frequent than choroidal tubercles and is only found in about five per cent. of the cases, while optic neuritis is found in but twenty-five per cent.[1] It is unfortunate that we cannot draw satisfactory conclusions from many of the case reports of our pediatrists because we cannot help but feel that their search for tubercles has not been very systematic in many instances, to say the least. It is unfortunate because they see most cases, as approximately sixty per cent. of the cases of tuberculous meningitis occur before the fifteenth year.

Among the text-books of neurology we have to choose between those who do not mention the occurrence of choroidal tubercles at all; those who believe they are rarely found, and those who think they are not infrequent. Statistics are rarely quoted so that the personal equation plays a great part. Even such larger works as the *Handbuch der Neurologie*[20] do not mention their presence in tuberculous meningitis. After searching about ten of the better text-books on neurology I could only conclude that they were very rare and that there is little use in looking for them at all. The introduction of the lumbar puncture has evidently made most neurologists abandon the hope of finding choroidal tubercles.

It is also interesting to know that even the text-books on ophthalmology seem to disagree upon the importance of choroidal tubercles. A number of the latest text-books do not even mention their occurrence in tuberculous meningitis. Michel[21] believes they occur in 35-40 per cent. of the cases. Uhthoff[8]

in ten per cent. of his cases. Others conclude from one article that they occur in fifty[22] to one hundred per cent.[23]

Most of the text-books on medicine that I have had an opportunity to investigate seem to be of the opinion that choroidal tubercles are uncommon, but should be looked for in all cases. Osler[19] is very conservative in saying, "The tubercles in the choroid are rare and much less frequently seen during life than post-mortem figures would indicate." Strümpel[24] believes that the ophthalmoscopic examination is very important as a positive finding may immediately establish a diagnosis. He says tubercles are sometimes not found and are only very rarely present. L. Brown[25] in *Modern Medicine* in speaking of choroidal tubercles in tuberculous meningitis says, "The reports as to the frequency vary greatly, some observers having failed to find them in a number of cases."

To draw conclusions of value from the cases reported in the literature has been very difficult. In reviewing the literature I have purposely omitted many reports of cases because it was quite evident that no attention or, at least, very little attention was given to the search for tubercles in the choroid. All of the articles from which I have drawn conclusions have appeared to me to be articles in which an honest effort was made to find the lesions, even though imperfectly in some instances. I have considered such articles as Herbert Koch's[1] as of especial value because he reported three hundred and five cases in which he says sixty cases were examined carefully for choroidal tubercles. He has, therefore, made a distinction between those cases in which they were looked for and those in which little or no effort was made to find them. In his series he found tubercles in eight cases of the sixty, or 18.33 per cent. Another article of value is that of Koplik,[26] in which fifty-two cases were reported and forty-six were examined carefully for tubercles, out of which nine cases were found or 19.5 per cent. On the other hand, I have considered such articles as Holt's[17] reporting three hundred cases of which seventy-five per cent. were tuberculous meningitis, and Meyers' one hundred and five cases as of little or no value in determining the frequency of tubercles in the choroid. I also have taken into consideration such reports as Marple's[23] in which he found the lesions in all thirteen cases as being a small series finding too high a figure to expect in larger series. In many of these case reports there is no autopsy confirmation of the findings, again allowing for a certain percentage of error in examination, which is, as a rule, small.

In only two references have I found choroidal tubercles occurring in more than twenty per cent. of the cases; namely, in the series of Marple's[23] finding them in one hundred per cent. and the series of Carpenter[22] and Stephenson finding them in fifty per cent. of their cases. Michel[21] says they should be found in thirty-five to forty per cent. Uhthoff[8] has collected a series from Garlick,[27] (Bouchut, Weissenfels[28]), Naskowic,[29] Kramer,[30] Wilbrand, Saenger and Gruening[31] (one case), and others averaging nineteen per cent. These figures agree with those which I have collected, which total 226, in which there has been at least a fair effort made to find choroidal tubercles. In this series of 226 cases of tuberculous meningitis where careful eye examinations were made, 33 showed tubercles in the choroid, or 14.6 per cent.

TABLE.

Name.	Cases of Meningitis.	Cases with Tubercles.	Percentage.
Koch[1]	60	8	13.33
Koplik[26]	46	9	19.5
Gruening[32]	40	2	5.0
Heinzel[33]	41	0	00.00
Garlick[27]	26	1	3.84
Marple[23]	13	13	100.0
Total	226	33	

Average 14.6+ per cent.

As medical men we should be inclined to take the figures of Koch[1] and Koplik[26] as our standards because the tubercles were found in routine examinations, as should be done on every well organized medical ward. If daily examinations are made and, if possible, several a day, we should find tubercles in fifteen to twenty per cent. of our cases.

I thought it might be of interest to review the statistics of the St. Louis Children's Hospital in this connection. From January 1, 1913, to January 1, 1916, there have appeared twenty-eight cases of tuberculous meningitis in the wards. Of the twenty-eight cases only eleven were examined for choroidal tubercles, according to the histories. Of the eleven cases examined, two cases showed choroidal tubercles and were confirmed by Doctor Green of the Ophthalmological Department. From these figures

we can clearly see that less than fifty per cent. of the cases of tuberculous meningitis were examined ophthalmologically and of those examined 18.18 per cent. showed choroidal tubercles. In no instance were more than three eye examinations recorded in the histories.

During the years 1912-13-14-15 to the first of December, we have had nine cases of tuberculous meningitis in our medical wards. In no instance have choroidal tubercles been found. Most of the cases died within one to four days after admittance. Two cases lived twenty-two days. In no instance were daily eye examinations made. In two instances no examinations were made. It is also well to mention that tubercle bacilli in the spinal fluid were found in but four of the cases. All of the cases examined were seen by members of the ophthalmological department so that a careful examination was done. In several instances, with which I have been acquainted, not all eye examinations were recorded, so that we have no absolutely correct idea of the number of examinations made. While these series of the St. Louis Children's Hospital and the Medical Department of the Washington University and Barnes Hospital are but small, they should impress upon us the necessity of examining our cases more frequently and seeing that all ophthalmoscopical examinations appear on our histories, even though negative. Only by doing this will our records be of value in the future in determining the frequency of choroidal tubercles in our cases of tuberculous meningitis.

CONCLUSIONS.

1. Choroidal tubercles are more frequent than the ordinary reports of cases of tuberculous meningitis would lead us to believe.

2. Complete autopsy reports including particularly reports of the eyes have been neglected in tuberculous meningitis.

3. In reporting the frequency of choroidal tubercles in tuberculous meningitis cases it is necessary to state the number of examinations made with the ophthalmoscope before drawing conclusions.

4. Systematic, frequent and accurate routine ophthalmoscopic examinations are neglected in cases of tuberculous meningitis.

5. Recording in histories every ophthalmoscopic examination is of the greatest value, even though examination is negative.

6. Lumbar puncture has led many to neglect ophthalmoscopic examinations.

7. Daily ophthalmoscopic examinations by members of the ophthalmoscopic department in addition to daily examinations by ward doctors is necessary.

8. Many of our text-books on medicine, pediatrics, neurology, and ophthalmology give either imperfect, erroneous or, sometimes, no idea of the frequency of choroidal tubercles.

9. Choroidal tubercles should be found in fifteen to twenty per cent. of all cases of tuberculous meningitis.

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MAGNET-EXTRACTION OF A PIECE OF IRON FROM THE EYE; AVULSION OF IRIS; GLAUCOMA; ENUCLEATION.

By Adolf Alt, M.D.,
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On March 30th, 1915, Mr. M. S., aged 40, called on me stating that on the previous day his right eye had been struck by something, he did not know what, while he was trying to remove a hoop from a grease barrel with hammer and chisel. I found a perforating wound in the corneoscleral tissue a little above the horizontal meridian on the nasal side. The iris showed a small coloboma and was caught between the wound lips. There was hardly any anterior chamber and some blood on the anterior surface of the iris. The displaced pupil was filled with opaque lens particles. V.=0 and T—1. On atropin instillations the pupil dilated somewhat, but no inspection of the interior of the eye was possible and no reflex could be obtained. A Roentgenogram, made at once, showed a foreign body situated on the temporal side somewhat in front of the optic papilla. (The Roentgenogram having become misplaced the exact measurements cannot be given.) The injury being of so recent a date, I thought it best and easiest to remove the piece of iron by the same route by which it had penetrated into the eye. However, it did not prove so easy. In fact, the foreign body was moved only from its resting place after three unsuccessful attempts with the magnet, and, when it finally gave way, it came out with an enormous speed and pulled the whole iris out with it. The anterior chamber at once was filled with blood. The patient made a very slow and frequently interrupted recovery. Several days of very comfortable existence would be now and then followed by one of severe pain. Meanwhile the hæmorrhage in the anterior chamber gradually disappeared and the cataractous masses melted away.

About 6 weeks after the accident the patient was taken with some other sickness and I never saw him again. Several months later he turned up at the Washington University Ophthalmic Clinic on account of glaucomatous attacks in this injured eye, which was finally enucleated.

The piece of iron measures 5 mm. in length, by 2 mm. in width, and about 1 mm. in thickness. At one end it has slightly curved

hook-like projections with which it probably was more or less firmly fastened in the tissues.

The pathological conditions in this eyeball produced by the entry and removal of the foreign body are of sufficient interest to be described.

Macroscopically the cornea and sclerotic appear thinner than normal. Not a trace of iris is visible. The lens is very much shrunken, forming a diaphragm about where in the norm the iris would be situated. The ciliary body is very thin. The optic papilla is deeply excavated. A number of connective tissue bands run from the retina into the vitreous body, which contains blood. One larger band starts above and a little behind the ciliary body and reaches across to the lower posterior part of the retina where it is attached to a plainly visible thickening of the tissues which from the Roentgenogram evidently is the place where the piece of iron was situated. As this band of newly formed connective tissue starts farther back than where the entrance wound was, it may, perhaps, mark the path by which the foreign body left the eyeball under the pulling force of the magnet. It is not at all impossible that, instead of travelling by the passage which it had taken through the vitreous body when entering the eye, it came out at a different angle and struck the outer wall of the eyeball somewhat behind the ciliary body above the corneoscleral wound, and from there gliding along the inner surface finally reached the corneoscleral wound of entrance. This may be the explanation of the fact that the piece of iron came out presenting its broad surface rather than its thin edge and thus dragged the iris along with it outside of the eyeball, instead of passing through the perforation it had produced in the iris simply in the reverse way from which it had gone in.

The iris having apparently been pulled out in its entirety and from its very insertion, the colleague assisting me at the operation remarked that here was evidently no more chance for the development of glaucoma in this eye. And yet, the eye was lost by glaucoma. It was, therefore, of especial interest to examine the angle of filtration microscopically. The occurrence of glaucoma was, as I expected, easily explained by the fact that there was nowhere any more chance for filtration. Everywhere the compressed fibres of the ligamentum pectinatum were filled with or covered with a newly formed connective tissue, which here and there was covered on the inner surface by a thick layer of pigment epithelial cells; in other places the foremost ciliary pro-

cess was firmly attached to this newly formed tissue. Schlemm's canal was obliterated in all the sections. How much of this apparently newly formed connective tissue was in reality changed iris tissue, tags of which may here and there, of course, have remained attached to the ciliary body, it is no longer possible to distinguish. (See Fig. 1.)

The next most interesting part of the eyeball was the place where the foreign body had struck the retina and choroid and remained lying until removed by the magnet.

This locality is chiefly characterized by a considerable swelling due to numerous superimposed layers of newly formed connec-

Fig. 1.

tive tissue between which numerous outgrowths of the pigment epithelium are embedded. (See Fig. 2.)

Choroid and retina have here evidently been torn. The torn choroid was probably at once filled with blood, and its present condition may still be referred to this. The lamina fusca is still attached to the sclerotic; in front of it (that is, toward the interior of the eyeball) are several cavities which vary in size and are partly or totally filled with blood. In front of these cavities lies a somewhat loose connective tissue resembling the normal choroidal tissue, only its cells contain no pigment whatever. In this tissue there are a few blood vessels and a focus of small

round cell infiltration near the posterior part of the swelling. From the anterior surface of this tissue replacing the choroid and of the vitreous limiting membrane which is torn, numerous pigment epithelial outgrowths arise and grow for some distance into and between the more or less regularly arranged layers of newly formed connective tissue which forms the larger part of the swelling Their appearance and arrangement correspond with what is now and then found in injured eyes and of which I have previously described a number of examples in an article on intraocular epithelial growths (this Journal, 1902, Vol. XIX, p. 97). These outgrowths probably follow in most instances a pulling force probably exerted by the shrinking

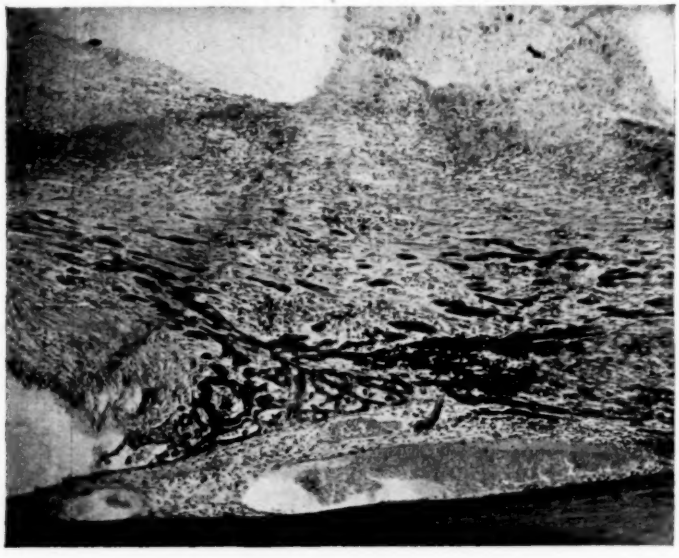

Fig. 2.

connective tissue. One portion of the pigment epithelium outgrowth in this place, however, varies from the remainder. Here the outgrowth consists of bands of single and double rows of cells which are unpigmented or contain but so little pigment that even with a high power it can hardly be seen. These bands surround small cavities in which small masses of free pigment lie and thus present an almost gland-like appearance (see Fig. 3). The retinal tissue in this part can no longer be traced, but it reappears in front and behind this swelling. It is œdematous and without nerve fibers in front of the attachment, but comparatively little altered posteriorly.

As stated above, a band of newly formed connective tissue runs from this swelling across the vitreous body to the opposite ciliary region. But there are several other smaller bands of connective tissue which run from different points of the retina into the vitreous body. These are probably the results of hæmorrhages into the vitreous body. Slender as they are, they have yet been evidently exerting quite a pull on the retina, because wherever they are attached the inner layers of the retina are pulled inwards and smaller and larger œdematous cavities are formed which reach into the outer layers and which are often separated

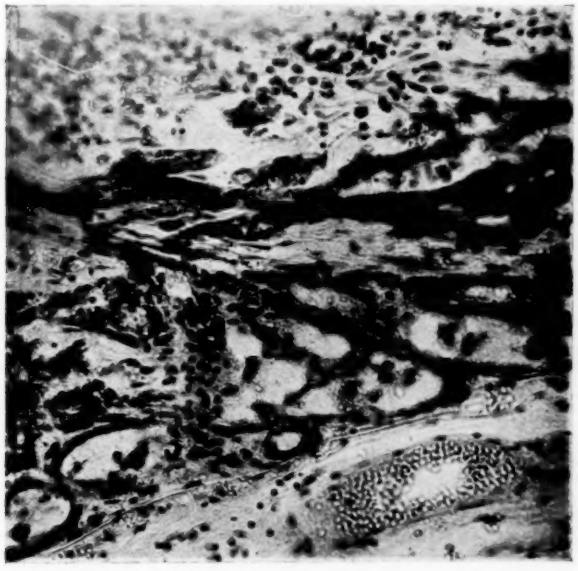

Fig. 3.

from each other only by pillars of supporting fibres as we see it in the cystic degeneration at the retinal periphery in older eyes.

The excavation of the optic nerve is covered with a mass of newly formed connective tissue which in its shrinkage has pulled the adjacent retina on the side opposite the retino-choroidal scar over the edge of and for some distance into the excavation.

The pathological conditions in the remaining parts of the eye are of no special interest.

TRANSLATIONS.

LACRIMAL CANALICULUS SUTURE.*

By Prof. Dr. A. Elschnig.

The reunion of an obliquely torn or cut lacrimal canaliculus with the preservation of the permeability of its lumen undoubtedly is of great value. It seems that thus far no method of accomplishing this has been laid down in literature. In Czermak's book on eye operations, injuries to the lacrimal canaliculus have not even been mentioned. In Wagenmann's† exhaustive description of eye injuries it is shortly mentioned that, when suturing a lid wound in the region of the lacrimal canaliculus, a probe must be introduced into the latter so that the suture cannot cause a constriction. Wagenmann states, concerning the treatment of injuries to the canaliculi, that "when the canaliculi are cut, it is best to prevent their obliteration by slitting them; and he further recommends, to leave a thick hair or a probe lying in the canaliculus." There are no details as to literature nor is there a description of the procedure.

The reunion of a severed lacrimal canaliculus can in the following manner be easily accomplished with the hope of success.

I suppose that, by a tear of the eyelid the lower canaliculus —as seems to be the rule in similar injuries—is torn about in the middle of its course. The wound is cleansed and the bleeding stopped by carefully dropping adrenalin on it.

Here I want to remark that the torn palpebral artery in the proximal part of the lid sometimes protrudes for some distance, and after wiping begins again to squirt. It is then grasped with a forceps and made innocuous by twisting.

Then a very thin whalebone or rubber probe (about like Bowman No. 1) is introduced into the lacrimal punctum and brought out of the wound through the peripheral piece of the canaliculus for about 10 mm. The nasal part of the lid being grasped with two forceps, one on the skin side and one on the conjunctival surface, is stretched so that the nasal end of the lacrimal canaliculus is laid bare. Its identity is proven by a fine probe.

Now a silk thread is introduced from the conjunctival side close to the posterior wall of the canaliculus, entered at the cor-

*Klin. Mtsbl. f. Augenhlk., Vol. LV, p. 144.

†A. Wagenmann. Die Verletzungen des Auges mit Beruecksichtigung der Unfallversicherung. Graefe-Saemisch. 2te Auflage. p. 860.

responding point close to the posterior wall of the lateral end of the canaliculus and brought out again on the conjunctival side. A similar suture is placed under the skin at the anterior wall of both ends of the canaliculus. These sutures remain untied. Then the nasal end of the lid is again well stretched, the nasal end of the canaliculus made to open and the probe which had been introduced through the lacrimal punctum introduced into the nasal part of the canaliculus and pushed into the lacrimal sac. Now the two sutures are quickly tied one after the other.

Then by means of a skin suture at the corresponding free lid margin the wound is completely closed.

While the sutures are being tied an assistant holds the probe pressed against the wall of the lacrimal sac, then the probe is shortened so that only about 2 cm. of it protrude beyond the lacrimal punctum. A sterile wad of cotton smeared with vaseline is, with the eyelids closed, put against the inner canthus in such a manner that the probe lies upon it. Bandage with sterile cotton smeared with sterile vaseline. With unruly patients binocular, otherwise monocular, bandage to be left if possible for 2 or 3 days before changing.

When the bandage is changed it is necessary after the superficial cotton wad has been removed to hold the probe with a forceps and press it during the further manipulations against the wall of the lacrimal sac so as to avoid its slipping out. Not before the fifth or sixth day the sutures are removed very carefully and a day after the probe is taken out of the canaliculus.

Thus far we had occasion to perform this little operation in five cases, in three cases in which the tear had taken place in from 4 to 6 mm. from the lacrimal punctum (all of these concerned the lower lid) a perfect cure resulted. In one case this result could be confirmed 1½ years later. The canaliculus was perfectly permeable.

In two cases in which the tear took place immediately next to the canaliculus and the wound lips were considerably crushed (these cases concerned the upper lid) no prime intention took place and the canaliculus remained severed.

Since this method is very simple and demands neither great technical ability nor specially trained assistance, it should be tried in all cases of tear through the lacrimal canaliculus, except when the contusion is so severe that suturing is altogether contraindicated.

ON VISIBLE CURRENTS IN THE ANTERIOR CHAMBER.*

By Dr. Frederik Berg,
Assistant.

(From Prof. Dalén's Clinic, Stockholm.)

When examining in oblique illumination with a Nernst lamp according to Gullstrand and an aplanatic lens a very sharply defined and intensely illuminating bundle of light is obtained, and with the aid of this very minute opacities in the aqueous humor can be detected. By letting this light bundle pass obliquely, before the black pupil, a good "dark field" illumination is obtained by using the black pupil for a background. An opacity in the aqueous humor appears in correspondence with the light cone as a distinct light streak, while the light bundle passes through the normal clear aqueous humor without producing such a light streak. With such an arrangement for illumination a slight opacity in the aqueous humor can be detected which it would be impossible to find with the ordinary method of illuminating and examining. Thus, for instance, when an iritis or iridocyclitis is apparently perfectly cured and the eye is perfectly free from irritation, we often find a slight turbulance of the aqueous humor persisting for a long time.

In general this light streak is perfectly diffuse for the unaided eye and with a magnifying lens, since the former elements which produce it (probably mostly leukocytes) are too small to be recognized. When it is, however, examined with a higher magnifying power, like the Zeiss corneal microscope, it is often seen that it consists of extremely fine, but distinctly recognizable particles which are suspended in the aqueous humor. The phænomenon is perfectly analogous to the well-known appearance when a bundle of sunlight rays passes through air filled with dust which from the distance looks perfectly diffuse, but nearby proves to consist of strongly illuminated grains of dust which fly through the air.

It has been seen that these fine particles in many cases are not at rest, but show a very beautiful current phænomenon. In all eyes in which this current has been observed it has been regular and always in the same direction, although the rapidity of the motion has varied considerably in different cases. What

*Klin. Mtsbl. f. Augenhlk., Vol. LV, p. 61.

struck me first and is most easily observed is an ascending motion which is present in the most posterior, deepest layers of the aqueous humor immediately in front of the pupil. The rapidity of this ascending current is sometimes fairly great; in one case it could be computed as 1 mm. in from three to four seconds. In other cases it is considerably slower. In a number of cases we found that the rapidity was greatest right in front of the center of the pupil and somewhat less towards the sides. How far peripherally the current reaches towards the sides, we have not been able to ascertain, since the movement cannot be seen in front of the iris tissue, or at least only with the greatest difficulty.

Somewhat more difficult to recognize, although equally undoubted is a current running in an opposite, descending direction, in the anterior layers of the aqueous humor nearest to the cornea. This current seems in general to be somewhat slower than the ascending one and, like it, to grow slower to both sides of the vertical meridian of the cornea. The difficulty in seeing these currents is in a large part due to the intense reflexes which are formed by diffusion where the light bundle penetrates the the cornea and which render the observation of the superficial parts of the light bundle going through the anterior chamber very difficult. By giving the light the proper angle of incidence to the cornea this difficulty can be overcome in a large measure. Above and below the two currents pass over into each other so that below a current from in front backwards results, and above one from behind forwards. In favorable cases the circulation of a certain particle can be followed; the particles differ often very considerably as to size and the movements of the larger ones can then be easily followed, and it is seen that the particle in front of the pupil rises rapidly upwards, gradually ceases to move, slowly approaches the posterior surface of the cornea and then sinks downwards with increasing rapidity in order to slow down again in its movement, to go slowly backwards from the cornea and then again to rise in front of the iris.

Thus the aqueous humor is in a steady, comparatively rapid circulation in which the posterior parts move upwards, the anterior ones downwards. The explanation of the phænomenon seems easy. The different parts of the eye do not all possess the same temperature. The posterior more sheltered and more vascular parts have a higher temperature than the anterior ones. A continuous loss of warmth takes place at the corneal surface at ordinary internal temperature by conduction

and evaporation of the lacrimal fluid. Direct measurements of the temperature of the different parts of the eye have been made by Michel (Graefe's Archiv., Vol. XXXII, p. 227) and Silex (Arch. f. Augenhlk., Vol. XXVI, p. 141), in both cases by means of properly formed thermo-elements. Michel found in his measurements in rabbits the following average temperatures: rectal temperature, 38.5 degrees to 38.9 degrees; middle of the anterior chamber, 31.9 degrees; vitreous body and lens, 36.1 degrees. The temperature of the anterior chamber was lower near the cornea and highest just in front of the iris where it was near the temperature of the vitreous body. Silex, based on his measurements on dogs and rabbits, states that the lamellæ of the cornea are 10 degrees lower in temperature than the co-temperaneous rectal temperature, the anterior chamber 6 degrees, the lens 3 degrees, the iris tissue 0.36 and the centre of the vitreous body 4 degrees. This shows that the posterior and anterior wall of the anterior chamber differ considerably in their temperature; in consequence the temperature in the anterior chamber is lower in the anterior parts and higher in the posterior ones. According to physical laws currents must result in a space formed like the anterior chamber and filled with a fluid material; at the warmer wall the fluid is warmed, and becomes specially lighter and therefore rises; at the colder wall it gives off warmth, becomes specifically heavier and sinks down.

Therefore we could say a priori that such a current must be present and this assumption has, as will be mentioned later, been previously mentioned.

It is further evident that it is a temperature current from the following experiment. The current is always in the direction of gravity. If, for instance, the individual turns to the side the current goes continuously in a vertical direction from above downwards, that is in the horizontal meridian of the eye, and it is, therefore, not bound to the vertical meridian of the eye. The following experiment is still more convincing. An eye which shows the phænomenon plainly is covered firmly by a watch glass and the space between the glass and the eye is filled with water of body temperature. The movement of the aqueous humor which had previously been observed comes to rest, the fine particles seem to stand still, clearly because the anterior and posterior walls of the anterior chamber are now of about the same temperature. If now the warming fluid is removed the movement is in a short time again as lively as before.

The observation of these currents is plainest and easiest, according to my experience, in patients who had been operated on for cataract. After I had once noted this phænomenon I have been able to see it in almost every case during the healing period, about in 10 to 20 days after the operation. With a healing process free from irritation the aqueous humor is found to be clear or nearly so, but a number of small, white, irregular, snowflake-like particles swim in it, probably small particles of the cataractous lens. The pupil being dilated by atropin the phænomenon can be observed excellently well and in these cases the rapidity of the movement is great. It is probably due in the main to the increased depth of the anterior chamber of the aphakic eye that the phœnomenon is so plain in these eyes. The form of the anterior chamber is then nearly plano-convex, while in the normal eye it is concavo-convex. It is evident that the first form is much more favorable for the development of such currents than the latter one.

In eyes in which an account of secondary cataract a discission had been made we often see the anterior layers of the vitreous body protrude through the pupil into the anterior chamber. These parts of the vitreous body may swing and tremble with the movements of the eyeball, but they do not move with the circulatory movements of the aqueous humor. Neither have we been able to observe a current from the vitreous body into the aqueous humor; nor a current from the posterior chamber through the pupil into the anterior chamber.

In cases of iritis or iridocyclitis of different ætiology (trauma, tuberculosis, rheumatism, etc.) the aqueous humor is, as a rule, more or less opaque. This opacity is often diffuse even with a high magnification so that no distinct particles can be differentiated in the light streak. Often more or less numerous particles can be seen suspended in the opaque aqueous humor which show no circulation, evidently because the aqueous humor is too thick. In a few cases we found in the almost clear aqueous humor, as in eyes after cataract extraction, plainly distinguishable formed elements which showed a more rapid or slower circulation.

The conditions under which the circulatory phænomenon here described is best observed are, therefore, that in the aqueous humor small but distinguishable particles are held suspended, that the aqueous humor is sufficiently thin and fluid and that the anterior chamber is of sufficient depth. That the same current

is, also, present in the normal eye, although it cannot be observed, must certainly be considered as being very probable. The cases which showed this current the plainest were such in which the aqueous humor was most like in the norm, that is, clear and thin and fluid, but contained a few small suspended particles.

In the literature at my disposal I have not found any mention of this phænomenon. Tuerk (Graefe's Archiv., Vol. LXIV, p. 481, and Klin. Mtsbl. f. Augenhlk., Vol. XLIX, p. 300), however, stated that such a current in the human eye was probable, even a physical necessity. Tuerk studied and analyzed the phænomenon which goes by the name of "Ehrlich's line." Ehrlich's line appears after the subcutaneous injection of a small quantity of fluorescin as a vertical green line with diffuse margins in the middle of the anterior chamber close behind the cornea. The phænomenon can be observed only until the coloration of the aqueous humor has reached its maximum, and no longer after this. A negative phase of this phænomenon has, also, been described which appears when the quantity of fluorescin in the anterior chamber decreases. In this stage there then sometimes a colorless or more or less colored line appears in the same place.

Ehrlich's line has been observed in rabbits and a few other animals. In most animals, however, as in man, this phænomenon cannot be produced, since the fluorescin mixes quite diffusely with the aqueous humor if it at all penetrates into it. Ehrlich's line was at first explained to be the expression of a secretory current in the aqueous humor, which according to Ehrlich would be due to a whirl formed by the meeting of two opposite secretory currents running horizontally. Others have explained it as a downward current of the aqueous humor containing fluorescin and, therefore, heavier, which had been secreted from the iris above.

Tuerk has shown that this phænomenon can be quite simply explained as due to a temperature current, as we have described above. In order to produce the development of such a current he made a model of the anterior chamber by means of a watch glass which was filled with water and then covered with another plane glass. To this fluid he added some fluorescin at the margin and heated the posterior side of this chamber and then observed the manner in which the fluorescin entered the fluid. He obtained the formation of a line corresponding perfectly with Ehrlich's line. He has, also, shown that in animals' eye in which Ehrlich's line cannot be obtained from a subcutaneous injection

of fluorescin, the injection of fluorescin into the anterior chamber is followed by similar current lines.

In all of these cases the current phænomenon is very fleeting, it can no longer be observed as soon as the fluorescin is homogeneously mixed with the aqueous humor. The phænomenon which I here described, however, can be interrupted or observed continuously, although in reality it is only the expression of one and the same current. Contrary to Ehrlich's line and Tuerk's experiments with fluorescin injection directly into the anterior chamber with oblique illumination the current can be seen in the largest part of the aqueous humor at the same time, not only the circulation of particles in the fluid which have been most strongly mixed with fluorescin. This explains why the comparatively rapid ascending current which I have observed in front of the pupil does not appear in the mixture with fluorescin. Tuerk states that the ascending current is most rapid at the periphery, and this may be due to the fact that the fluorescin is mixed with the aqueous chamber at the periphery and that the central parts are at first not colored or at least less colored.

Tuerk's model of he anterior chamber described above will, also, serve to demonstrate the current I have observed. To this end the chamber is filled with water to which a trace of India ink has been added. If now the plane surface is warmed, for instance, with a thermophore, a vivid circulation takes place in the chamber exactly alike the one observed in the eye. If the same illuminating apparatus, Nernst lamp and aplanatic lens, is used against a dark background, a plainly visible ascending current is seen along the whole posterior wall and a descending one along the anterior wall. Tuerk states that a regular current cannot be observed if the fluorescin is added to the water in this chamber after the heating has been going on for a long time, and he explains this lack of agreement with the conditions in the eye as due to the small loss of wamth on the convex surface of the chamber. However, in the India ink solution an uninterrupted and regular vivid current can be observed for any length of time, if the temperature of the posterior surface is kept at from 40 to 45 degrees C., and the anterior surface is exposed to the air of ordinary room temperature. The constant warming and the constant loss of warmth are here, also, sufficiently strong to produce a continuous current and the analogy with the conditions in the eye is perfect.

Tuerk considers it as probable that the current he has ob-

served in a large number of animals' eyes is, also, present in the analogously built human eye. Yet, he says, such a current can be seen in the normal eye only when visible formed elements or otherwise colored particles move about and indicate the direction of the current. These conditions Tuerk has never seen fulfilled in the human eye. He, however, refers to some phænomenon which without such current in his opinion cannot be satisfactorily explained. He especially dwells on the arrangement of precipitates below on the posterior corneal surface in the shape of a triangle which in his opinion is easiest explained as the result of a regular circulation in the aqueous humor. He thinks that in this portion no current exists or that it is at least very weak. It is doubtful whether Tuerk's explanation is the correct one because in the parts of the chamber, a sector below, in which, according to his opinion, the aqueous humor is at standstill, there is in reality a continuous movement as in the remaining parts of the chamber. We shall probably, further on, have to explain the arrangement of the precipitates in the lower part of the posterior corneal surface, too, as being the result of gravity and centrifugal force.

That these precipitates grow larger or smaller and sometimes in a short time, can be, it seems, satisfactorily explained by the circulation of the fluid. The particles which have become attached to the posterior corneal surface are continually surrounded by a current of aqueous humor, which according to its composition and richness in formed elements either gives some of these up and helps to increase the precipitates or takes up some of the precipitates and thus causes their absorption.

This communication is then complementing Tuerk's observations on the circulation of the fluid in the anterior chamber, and in the main confirms Tuerk's assumption of similar conditions in the human eye. Since these observations have apparently not been previously made or aroused attention, although doubtless of a certain interest, it seemed to me proper to report them.

MEDICAL SOCIETIES.

PHILADELPHIA POLYCLINIC OPHTHALMIC SOCIETY.

Stated Meeting, November 11th, 1915.

Dr. Wm. Zentmayer in the chair.

Subject: Symposium on "Muscle Imbalance and its Treatment."

Anomalies of Refraction.—Dr. Zentmayer said that about 90 per cent. of ametropes show a deviation of the visual axis when fusion is broken up, either by making the image of the object fixed different for the two eyes or by displacing the image in the one eye. How are we to view these slight deviations? Landolt believes they are in no sense pathologic and are not even to be considered as tendencies to deviation, but simply show the position the eye would take if binocular vision were destroyed. Others look upon them as due to a disturbance between accommodation and convergence produced by the ametropia, while still others believe that certain types represent a stage in evolution; that is, that exophorias are sometimes an expression of atavism. Hyperphoria is probably always anatomic.

Dr. Reber has endorsed this view. Using the terms representing the nature of the deviation rather than the conditions underlying them, such as convergence insufficiency, etc., it may be said that esophoria in the distance in hypermetropia is due to the convergence associated with the accommodative effort required to correct the hyperopia. The same muscle status in myopia is more difficult to explain.

Dr. Wallace has suggested that it is due to the excessive convergence used by myopes at near work not relaxing in distant vision. This may explain the moderate degrees, but it seems inapplicable to the very large number of low degrees of myopia met with. In all classes there are a few due to anatomic causes. Hyperphoria is of less frequent occurrence than lateral tendencies, occurring in about 50 per cent. of ametropia. As in the great majority of cases it is of very low degree, it does not frequently call for correction. Less than 2 degrees usually produces no symptoms. The effect of the correction of the ame-

tropia upon the heterophorias of very low degree is not marked. Esophoria associated with hypermetropia is usually reduced in amount. Exophoria for near associated with myopia will be reduced by the correction of the myopic refraction. The principles to be borne in mind in ordering glasses for the ametrope in the presence of a heterophoria are that in convergence excess the total hypermetropia is to be corrected, in convergence insufficiency only as much of the hypermetropia as is demanded by the age of the patient and his occupation. In myopia with convergence insufficiency the myopia is to be fully corrected. In myopia with divergence insufficiency, an unusual condition, an undercorrection is indicated.

Prism and Operative Treatment.—Dr. Posey spoke of the incorporation of prisms with the lenses correcting ametropia as one of the most valuable means of overcoming muscular asthenopia. The chief value of prisms when used in this way, he thought, was in hyperphoria, though he could give no fixed rule to follow for their employment in these classes of cases. Vertical insufficiencies of 1 degree or less very rarely require correction, and indeed the correction of the ametrope usually relieves the symptoms attending hyperphoria of even 2 degrees; yet he had prescribed vertical prisms in some cases of hyperphoria of less than 2 degrees, where such symptoms as unilateral headache, unilateral twitching of the eyelids and dizziness had persisted after careful sphero-cylindrical corrections. Defects of over 5 degrees usually call for a tenotomy of an elevator. In no case is it desirable to prescribe a prism which corrects all of the hyperphoria.

In exophoria of moderate degree, prisms with bases in correcting a third or a fourth of the muscle error, are very useful in combination with the ametropic correction for near work. When strengthening of adduction by operation, preferably by a deWecker capsule, advancement of both interni is refused by the patient, prisms with bases in are often of value for constant use; but in no case should a prism higher than 5 degrees in each eye be prescribed, on account of certain optical disadvantages as well as the weight of the lenses.

In esophoria, prisms with bases out have a limited usefulness. Dr. Posey prescribes them chiefly in cases of hypermetropia with esophoria of about 10 degrees, when troublesome distance asthenopia is present, and when the full correction of the hypermetropia cannot be prescribed on account of residual spasm of accommodation.

Dr. Posey asserted that in his opinion nearly all muscle errors, apart from those associated with considerable degrees of ametropia, are dependent upon faulty anatomical conditions. He has found prism exercises of value only so long as they were maintained, and he has never seen any permanent change in the muscle error result from them. While the constant use of prisms does perhaps in some cases unmask latent muscle errors earlier than is the case if prisms are not prescribed, this precipitous unmasking is not harmful, and occurs in such a slight degree that in most instances it is unnecessary to increase the strength of prisms to alleviate a recrudescence of muscular asthenopic symptoms. Dr. Posey described graduated tenotomies, so-called, and believed no operative measures justifiable unless there is an appreciably high muscle error. When the external rectus is divided for the relief of exophoria, prism exercise to bring up adduction should be actively practiced for weeks afterward. In such cases systematic rhythmical exercises, with increasingly stronger prisms, were of decided value. He had never seen permanent benefit derived from exercises of the abductors or of the elevators or depressors.

DR. W. W. WATSON, Secretary.

ABSTRACTS FROM MEDICAL LITERATURE.

BY W. F. HARDY, M.D.,
ST. LOUIS, MO.

RETINITIS OF PREGNANCY.

J. Herbert Fisher (*Proceedings of the Royal Society of Medicine*, July, 1915) makes it clear that he has selected his title deliberately and with care. An ever increasing number of ophthalmic surgeons are taking the later and more enlightened view, that it is improper, inexact and unscientific to refer to albuminuric retinitis of pregnancy. The internists and others have for some time urged against this nomenclature. Fisher points out that the attendant nephritis is due to the same cause as the retinitis, that both are therefore the result of a common agent and that agent is most probably a toxic one. The fear is expressed,

and not without reason, that the ophthalmic branch of the profession is getting behind the times in reference to its knowledge of general medicine. An interesting quotation is given from Turney, written in 1896, and bearing on the relationship ætiologically of such affections as the retinitis of pregnancy, acute yellow atrophy of the liver and renal disease of pregnancy. The latter is stated to be strictly a blood disease.

So far as they occur together retinitis of pregnancy and albuminuria should be disassociated, for it is a patent fact that either may and frequently does exist without the other. Therefore an albumin-free urine need not rule out a diagnosis of toxic retinitis in a pregnant woman.

Eclampsia, which is probably an excessive and fulminant evidence of toxæmia, may burst forth without the urine having given any previous warning. Fisher, in a most interesting way, shows the evolution in our views concerning these deplorable conditions accompanying pregnancy. Pathologists and obstetricians being convinced of a toxin or toxins being responsible did not rest at this point, but endeavored to find the nature of the poison. The matter is not settled but progress has been made. At least a name has been attached to the toxins, viz., syncitiotoxins, by which is meant the products of the disintegration of the syncitium cells. These are described as the outer of two layers of cells of fœtal origin, which form part of the developing placenta and lie next to the maternal mucosa. They are so named from their immediately connecting the fœtal and maternal structures. Their origin and function is physiological, and when their purpose is served their death is likewise. One might say the formation of toxins in one's body is a physiological process. It is not the formation but the failure of proper elimination of toxins which acts deleteriously on the economy. The action of syncitial-toxins is dealt with more fully by Fisher, but does not lend itself well to abstract. Nine case reports are given in full. He finds it difficult to group them. Good recovery of vision is said to be the rule, accompanied by disappearance of all acute manifestations in the retina, differing thereby strikingly from ordinary renal retinitis cases. Some peripherally situated pigment disorder is usual. Permanent defects of vision appear to depend upon changes in the walls of the retinal arteries or on an atrophic condition of the nerve, which if ascending is probably due to secondary changes in the ganglion cells, the result of imperfect blood supply. The patients may live for many

years; a recurrence of the retinitis does not necessarily appear with subsequent pregnancies. In some instances the albumin disappears entirely and in others not. One gathers from Fisher that he does not advise against future pregnancies. A scrutiny of his cases shows that some of the patients died directly of renal troubles, or of conditions secondary thereto. While it is conceivable that a woman may go through subsequent pregnancies without trouble, it seems to the reviewer that it is playing with fire or courting disaster. A woman recovered from the effects of a pregnancy toxæmia may have suffered such injury to her excretory organs that a hairline advantage of elimination is maintained. Subsequent pregnancies, while not setting up an acute condition, may so embarrass the excretory organs that the narrow advantage is lost and a chronic interstitial fibrosis is initiated.

THE BLIND SPOT.

The *Illinois Medical Journal*, September, 1915, contains a preliminary report on the blind spot by Harry S. Gradle. The history of this interesting area is briefly gone over from its discovery by Marriotte in 1668 to recent times when the greatest advances have been made. The practical application of the blind spot is attributed to Van der Hoeve who, in 1909 and 1910, reported an increase in the size of the blind spot for all colors accompanying cases of sphenoiditis and posterior ethmoiditis. Gradle states that a study of the anatomy and anatomical relations of the orbit and its contents is necessary for a proper appreciation of conditions influencing the enlargement of the blind spot and the production of central scotomata. It is known that the fibres emanating from the retina immediately around the disc are found in the periphery of the optic nerve, conforming to the contour of the sheaths and that this topography exists until the chiasm is reached. The bony walls separating the orbit from the nasal sinuses are thin and honeycombed with perforating or diploic veins. The intra-canalicular portion of the orbital periosteum blends with and becomes inseparable from the intra-canalicular portion of the dura mater. There therefore exists an intimate relationship between the dura of the optic nerve and the periosteum of the accessory sinuses by way of the diploic veins and the orbital periosteum. The anterior 15 mm. of the optic nerve is cared for by central artery of the retina and its veins. Back of this there is a small portion of the nerve without

vessels except for a few capillaries. From a point 25-30 mm. back of the globe the veins of the dura drain towards the center of the nerve, finally uniting near the optic foramen to form the vena nervi optici centralis posterior (central vein of Kuhnt and Vossius) which empties into the cavernous sinus. The papillo-macular bundle lies in a crescentic form to the temporal side of this vein. Thus from an anatomical point of view can be explained the enlargement of the blind spot in accessory sinus disease and also the central scotomata due to the same cause; the former from periphereal involvement the latter from inflammatory changes, embolism or other process affecting the Kuhnt-Vossius vein. The object of the first part of Gradle's paper is to introduce a simple and accurate method of testing for enlargement of the blind spot. This is accomplished by an apparatus of the author's own devising which is simple, meritorious and unique. He uses a screen one-half meter square, a chin rest, a testing point of blued steel ball bearing operated by a small electro-magnet behind the screen and therefore hid from the sight of the patient. He has found after trials that a working distance of 60 cm. to be the most practical. Even the projectons of the vessels as they leave the upper and lower borders of the disc can be mapped out. The author states that the entire apparatus is simple and can be constructed easily by anyone with a penchant for carpentry.

SPECTACLED SOLDIERS.

The following is an editorial of the *Boston Medical and Surgical Journal,* August 5, 1915:

"A question which is now engaging the attention of recruiting officers across the sea is the advisability of allowing men who wear glasses to enlist in the army. Should the United States become involved in this or any other war, this problem would be presented to our army and more particularly to the army medical officers. It might indeed assume grave proportions with us on account of the prevalence of visual defects among Americans. An argument against enlisting such men, which will at once occur to military surgeons and to other physicians who have attended men in prisons or other places where there was a temptation to avoid duties of various kinds, is the ease with which men with glasses may avoid active duty, if they are so inclined, by simply breaking or losing their glasses. Then of

course these accidents may actually happen and deprive the army of the recruit's services for a period if the visual defect be of such a dgeree as to incapacitate him.

"Another factor which must be taken into consideration is the severe character of wounds of the orbit in soldiers wearing glasses. This peculiar susceptibility of spectacled men is recognized by the laws of most communities which provide for a harsher penality for one committing an assault on a man with glasses than on one without. It is also considered hazardous for such a man to play professional baseball, so much so that we find in the two major leagues, employing between three and four hundred players, only one man with glasses, and he is regarded as something of a curiosity, being the only one of the sort for a number of years. A projectile striking a pair of glasses with considerable force would drive the splintered fragments of glass directly into the brain, inflicting an almost necessarily fatal wound. This is not pure hypothesis, for since the present war began we have received frequent reports of severe injuries sustained by officers wearing wrist watches which came into contact with flying pieces of shell or bullets. Even those in the immediate vicinity of soldiers wearing glasses might be endangered by the fragments of glass, just as is the case now with wrist watches.

"Of course there will be some applicants for enlistment who will be desirable on account of special knowledge or because they have had experience which fits them for certain departments of the army, even though they are handicapped by some visual defect. Then, too, the exigencies of the situation may become such that disabilities of this kind will have to be waived. The whole matter will, of course, be decided by the military authorities, but it seems that the opinion of the medical profession, which will undoubtedly be asked, will be against the enlistment of men with glasses on account of the ease with which they may malinger, their liability to become incapacitated by accident to their glasses and the peculiarly severe nature of the wounds which they may sustain."

TRACHOMA AND FOLLICULAR CONJUNCTIVITIS.

(A Successful Treatment by the Intense Bichloride Rub.)

Beals, of New York City (*N. Y. Med. Jour.*, November 13, 1915) from his experience with a large number of trachomatous school children concludes that the usual and ordinary treatment

of trachoma fails. Combined with treatment to modify the intense reaction which often follows the first few applications, Beals uses an intense bichloride rub and states that the results are so far superior to other methods that in most cases it should supersede them. It is equally efficacious in trachoma and follicular conjunctivitis. The procedure is as follows. Three instillations of 10 per cent. cocaine solution are made in each eye at five minute intervals and then a wait of fifteen minutes. A three-sided applicator is used, cotton is twisted firmly about it and is of the size of a lead pencil. The patient sits before the operator with head tilted back. The lid is raised from the eye with the left hand, the applicator is dipped in bichloride of mercury solution 1 to 1,000 and passed as far up under the lid as possible. The patient is looking down and while doing so the operator passed the probe from side to side, rotating it the meanwhile on its own axis opposite to the side to side motion. While this is being done the lashes are not held by the left hand but the lid is kept on the stretch by the probe. With the patient looking up the same procedure is carried out on the lower lid. After the first few treatments the operator gets a show of blood on the cotton. Cold is applied for the next few hours and a 1 to 5,000 bichloride solution instilled three times a day until the next treatment, which is given in five to seven days. As the case clears up, only the affected conjunctiva is rubbed. After the first two treatments, all discomfort disappears in fifteen to thirty minutes. Beals evidently uses this treatment when pannus is present. He reports very satisfactory results after about two months' treatment. One of the most gratifying results is the virtual absence of scar tissue. Beals concludes by saying that the treatment is severe on the children and difficult for the ophthalmologist to administer and requires tact as well as skillful technic.

SOME UNUSUAL FORMS OF CONGENITAL CATARACT, WITH REMARKS ON THEIR MANAGEMENT.

Posey (*Penn. Med. Jour.*, February, 1915) states that while ordinary congenital cataract presents few problems, yet there occasionally occur cases which demand considerable skill and good judgment. Points about which there is discussion are the age of the patient when operation is advisable and the manner of operating. Some believe in early operation, needling or needling plus extraction of the swollen lens masses with the curette.

Others are more conservative and employ a series of needlings extending over a period of several months. Posey thinks it unwise to do an operation on a child less than ten months of age, because at this time the eyeball has grown and developed to a size making the use of instruments feasable which at an earlier age is not so. Furthermore the child is still young enough to have lost nothing in mental development by reason of poor vision. Another factor entering into the question is the extent of opacification of the lens and the degree of vision. It is stated that the amount of aqueous humor in a child less than ten months of age is insufficient to dissolve the liberated lens material. An advantage claimed for operation at ten months is the stimulation afforded to mental development by the acquisition of sight. Where opacification is not complete and vision is fairly good it is wisest to postpone operation until the child is three or four years old. Repeated and cautious needlings are to be preferred to rapid removal in mass. A complication which may present itself and tend to defeat the operator is a dense and tough lens capsule. It may be necessary in such cases to remove the capsule with capsule forceps. At times the density of the capsule is apparent on inspection. As pointed out by Treacher Collins, the tough resistant membranes met with in congenital cataracts are often due to a malformation of the anterior part of the vitreus and that in some cases he had obtained good results by the displacement downwards, of the opaque tissue. The ordinary needling is advised even in these cases as a preliminary measure, allowing thereby the operator to judge of the constituency of the tissue and also exposes whatever lens substance may be present to the solvent action of the aqueous humor. Displacement should be tried if needling fails or the tough membrane still blocks the pupillary area. Posey believes with Mr. Collins, that in cases in which the pupil is small and does not dilate well with atropine, it is best to begin with an iridectomy. In these unusual forms of congenital cataract the visual results are problematical, and the surgeon should therefore be guarded in his prognosis.

SOME FURTHER OBSERVATIONS ON VERNAL CONJUNCTIVITIS IN THE NEGRO.

Dunbar Roy (*Southern Med. Jour.*, October, 1915) remarks that his interest in the past had been aroused by a peculiar form of conjunctival inflammation occurring in negroes which did not

conform to the types of trouble familiar to him. After a systematic study he was convinced that the disease observed by him was vernal catarrh. In the last ten years he has seen 100 cases and they have shown a characteristic composite group of symptoms. The atypical cases were ruled out. The typical case was of the bulbar type. The ages varied from 3 years to 26 years, the majority being between 6 and 12. As to sex, the cases were equally divided. Most of the patients had had the disease for from two to five years. The subjective symptoms were photophobia, a heavy feeling, burning and gritty sensation about the lids. The discomfort was not, however, great. The objective symptoms were congestion of both bulbar and palpebral conjunctiva with some signs of catarrhal discharge. The changes in the palpebral conjunctiva were limited to congestion. At the limbus there was an elevated circular waxy and gelatinous mass, extending from one-half to even four millimeters on to the cornea and was widest at the upper and lower margins of the cornea. There was an occasional pigmentation at the conjunctival edge of the hyperplasia. The hyperplasia was proven to be in every case, virtually a part of the cornea itself, as it could not be separated without cutting or shaving it. Specimens were examined microscopically and a summary of the principal alterations were: (1) Localized thinning of the surface layer of epithelium, the swelling and vacuolization of many of these elements, the presence of eosinophile cells between these elements. (2) The projection downwards into the deeper structures, of club-shaped columns of epithelium containing usually more or less centrally located cavities. (3) The presence in these cells of peculiar bodies which may be the result of degeneration of these bodies or possibly parasites. (4) The presence between these columns of enormous numbers of plasma and lymphoid cells, quite a number of eosinophile cells and some newly formed fibrous tissue.

In discussing the diagnosis Roy states that he has never seen a single case of trachoma in the negro, this latter disease being frequently confounded with vernal catarrh. Stress is laid on the finding of eosinophiles. Roy's cases recurred and persisted during the warm months and he contends emphatically against the dictum of Bruns that such cases are examples of phlyctenular conjunctivitis.